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RECENT LITERATURE.

The Canadian Ice Age.¹—This volume, an octavo of 300 pages, is a compilation of observations bearing upon the history of the northern half of the North American Continent during the Ice Age, recorded by Sir Wm. Dawson since 1855. The generalizations are not extended beyond the Canadian border, but the author's conclusions deny the possibility of large accumulations of land ice on an interior continental plain, south as well as north of the Canadian boundary. In fact, at that time, according to the author, there was no interior plain. An ideal map of Canada during the Plistocene Age, shows the northern half of the continent to consist of three large mountainous islands, the Cordilleran, the Laurentide, and the Appalachian, with Greenland to the north, surrounded by ice laden seas and straights. These islands were the gathering-grounds of the snow and ice that, in the form of glaciers and icebergs, were such powerful agents in modifying the topography of the continent. The ice movement on these islands appeared to be outward in all directions from a central axis or plateau, analogous to what is taking place in Greenland at the present day. The "Terminal Moraine" of the glacialists represents the shore line of the ice-laden sea where floe-ice and bergs grounded with their burden of boulders and other débris. Anomalies in the levels of the so-called terminal moraine are due to differential elevation. The author gives a résumé of the the present knowledge of the glacial movements during the Plistocene period, as shown by the striae, and the conditions under which the Boulder-drift of Canada was deposited as proofs of the above theory.

The succession of deposits is treated of at length, and the subject is summarized in tables of succession and correlation. In an ascending order the strata are (1) a lower boulder clay or till resting on heavily striated rock surface, representing shallow water deposit; (2) Leda clay, the greater part of which, from the evidence of its fossil contents, was laid down in water from 20 to 100 fathoms deep; (3) surface boulders.

In regard to the striae, the author makes the following general statement as to the agents producing them:

¹ The Canadian Ice Age. Being Notes on the Plistocene Geology of Canada, with especial reference to the Life of the Period and its Climatal Conditions, and lists of the specimens in the Museum. By Sir J. Wm. Dawson. Montreal, 1893.

"In summing up this subject, it may be affirmed that when the striation and transfer of materials have obviously been from N. E. to S. W., in the direction of the Arctic current, and more especially when marine remains occur in the drift, we may infer that floating ice and marine currents have been the efficient agents. Where the striation has a local character, depending upon existing mountains and valleys, we may infer the action of land ice. For many minor effects of striation, and of heaping up of moraine-like ridges, we may refer to the presence of lake or coast ice as the land was rising or subsiding."

Again, "Sea glaciation is always accompanied with much smoothing and polishing, and on very hard rocks the striation is comparatively imperfect, while it is not quite uniform in direction and often presents two sets of striae. The action of true land glaciers, especially when moving down considerable slopes, produces deep grooves, as well as striae, on vertical as well as on horizontal surfaces, and is more fixed and uniform."

The summary of fossils given in Chapter VI, comprises 240 species, of which 33 are plants; the rest are distributed as follows: Protozoa, 21; Echinodermata, 7; Mollusca, 142; Vermes and Arthropoda, 30; Vertebrata, 7. From both flora and fauna the author infers an amelioration of the climate, resulting, in his estimation, from the gradual elevation of the land which threw the Arctic currents from its surface, exposed a larger area to the direct action of solar heat, and probably determined the flow of marine currents so that the heavy northern ice was led out into the Atlantic instead of being drifted southwest over the lower levels of the continent.

The leading thoughts in this collection of papers is the relative value of land ice and water-borne ice as causes of geological change during the Plistocene period. These two agents, together with the complex elevations and depressions of the continent as shown by the deposits and their fossil contents account for the effects observed.

This paper is an important one, and will probably correct the extravagancies into which the past glacialists have fallen.

The Mollusc-Fauna of the Galapagos Islands.²—The molluscan forms collected by Professor Leslie A. Lee and his assistants, on the voyage of the U. S. Fish Commission Steamer *Albatross*, from

² Scientific Results of Explorations by the U. S. Fish Commission Steamer *Albatross*. No. XXV. Report on the Mollusk-fauna of the Galapagos Islands, with Descriptions of New Species. By Robert E. C. Stearns, Ph. D. Adjunct Curator of the Department of Mollusks. Proc. U. S. Nat. Mus., Vol. XVI, (1893) pp. 353-450, with plate and map.